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MPCA, Ground Water
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SUPPLEMENTAL
WORK PLAN FOR
FREEWAY LANDFILL
REMEDIAL INVESTIGATION

PREPARED FOR:**R. B. MCGOWAN COMPANY, INC.****NOVEMBER 1989****PREPARED BY:**BRUCE A. LIESCH ASSOCIATES, INC.
HYDROGEOLOGISTS • ENGINEERS • ENVIRONMENTAL SCIENTISTS

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PLYMOUTH, MINNESOTA 55447

NOVEMBER, 1989

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1.0 INTRODUCTION

Freeway Landfill (the Landfill), located in Burnsville, Minnesota (see Figure 1), has been in operation since June, 1969 and has operated under a permit issued by the Minnesota Pollution Control Agency (MPCA) since October 14, 1971.

In 1986, the MPCA issued a Request for Response Action (RFRA) which required the evaluation of environmental impacts, if any, caused by the Landfill.

R.B. McGowan Company, Inc. (the Landfill owners), initially retained Conestoga-Rovers & Associates (CRA) to complete the Remedial Investigation (RI) of the Landfill. The RFRA documents which have been submitted to the MPCA by CRA are as follows:

- o Site Security and Safety Plan (7/30/86)
- o Evaluation Report (Revised 11/10/86)
- o List of Possible Alternative Response Actions (Revised 11/10/86)
- o RI Work Plan (Revised 11/10/86)
- o Quality Assurance Project Plan (Revised 11/10/86)
- o Remedial Investigation [Report] (2/16/88)

The Remedial Investigation Report presented and discussed the findings of the work completed in accordance with the RI Work Plan which was approved by the MPCA on December 29, 1986.

Following their review of the Remedial Investigation Report, the MPCA indicated in a letter dated April 21, 1988 that additional work would be required to address certain unresolved issues identified by the MPCA, regarding the physical characteristics of the Landfill site.

Discussions between the MPCA and R.B. McGowan Company, Inc. (RBMCI) continued through the summer of 1989 regarding the unresolved issues identified by the MPCA. Ultimately, the MPCA requested that additional work, including the installation of four new monitoring wells, be completed. RBMCI subsequently retained Bruce A. Liesch Associates, Inc. (Liesch) to complete the work required for the RI/FS.

The elements required for completing the RI/FS were presented in the Liesch letter dated July 21, 1989 and the MPCA letter of response dated August 11, 1989.

Since the remaining RI activities are supplemental to work previously completed for RBMCI by CRA, reference will be made wherever possible to information previously submitted to the MPCA. The RI documents which have been submitted to the MPCA are listed above.

This Supplemental Work Plan pertains to the work which is required for completion of the RI. Companion documents to this Supplemental Work Plan include the Supplemental Quality Assurance Project Plan (Liesch, October, 1989) and the Revised Site Safety Plan (Liesch, October, 1989).

2.0 PHYSICAL CHARACTERISTICS OF LANDFILL

A complete characterization of the physical characteristics of the Landfill based on existing data has been presented in the Remedial Investigation Report (CRA, February, 1988). The location of the site in Burnsville, Minnesota is shown on Figure 1. A site map illustrating well locations and other pertinent site information is presented as Figure 2.

The general hydrogeologic characteristics apparent at the Landfill, as described in the Remedial Investigation Report (CRA, February, 1988) are noted below:

- o The uppermost soil unit consists of 15 feet of sandy loam and fine loamy sand, thinning to the south.
- o Variable thicknesses of silty cohesive loams, clay loams, and peat underlie the uppermost soil unit. These low-permeability deposits also thin to the south and lie directly atop the bedrock. Depth to bedrock ranges from 20 to 51 feet below the northern portion of the site to 3 to 19 feet below the southern property line.
- o The Prairie du Chien Group dolomites represent the uppermost bedrock unit. Thickness ranges from 75 to 120 feet. Visual inspection of the dolomite exposed in the nearby Kraemer quarry and McGowan quarry indicates that it is weathered and extensively fractured.
- o The Jordan sandstone underlies the Prairie du Chien dolomites.
- o The water table lies within the Prairie du Chien bedrock. Currently, groundwater flow beneath the Landfill is to the southwest with discharge to the adjacent Kraemer bedrock quarry.
- o Undisturbed groundwater flow beneath the Landfill was from south to north towards the Minnesota River. Currently, however, groundwater flow patterns have been modified by pumping activities at the Kraemer quarry.

3.0 SITE HISTORY AND BACKGROUND

Information regarding the history and background of the Landfill, including the types of wastes disposed at the site, is included in the Evaluation Report (Revised November 10, 1986) prepared by CRA and approved by the MPCA December 29, 1986. A brief summary of the events which have taken place during the RI/FS has been presented in the Introduction (Section 1.0).

4.0 PROJECT OBJECTIVES

The objective of completing the work proposed is to provide the information identified as being necessary for completing the RI. Ultimately, the purpose of the RI is to define the hydrogeologic conditions and the extent and magnitude of environmental impacts emanating from the Landfill. This information will be used for the selection and implementation of response actions (if any) identified by a Feasibility Study.

The project objectives required for completing the RI/FS, as presented in the Liesch letter dated July 21, 1989 and the MPCA letter of response dated August 11, 1989, are described below:

- o Construct two additional well nests at locations shown on Figure 1 (attached). Each well nest will consist of two wells. The lower well will be cased through the Prairie du Chien and open to the upper Jordan aquifer. The upper well will be cased through the unsaturated Prairie du Chien open to the saturated portion. If collapsing sand beds are encountered, wells will be screened. Slug testing, geophysical well logging, development and stabilization will also be conducted.

- o Surface water monitoring stations, these four new wells, the U.S. Salt well and existing wells WT-6, WT-9, WT-10, WT-11B, WT-12B will be sampled twice and analyses run for field parameters, VOC's and metals. The second round of analyses may be limited to VOC's and field parameters (Note: U.S. Salt must provide access to their well).
- o The Kraemer Quarry seep will be sampled with the first sampling event and analyzed for VOC's and metals to assess whether or not it is a pathway for ground or surface water contamination.

5.0 MONITORING WELL CONSTRUCTION

The 4 new wells proposed will be constructed as two well nests. At each nest, the lower well will be cased through the Prairie du Chien and open to the upper Jordan aquifer. The upper well at each nest will be cased through the unsaturated portion of the Prairie du Chien and open to the upper saturated portion. Well construction will meet all requirements of the Minnesota Department of Health (MDH) Water Well Construction Code.

Installation of the four additional wells is a MPCA requirement for completing the RI.

Wells installed during the initial phase of the RI are discussed in the Remedial Investigation Report (CRA, February, 1988).

Details regarding proposed well installation will be submitted to the MDH for review and approval according to the requirements of the Water Well Construction Code part 4725.1860 subpart 4.B.

To eliminate any potential cross-contamination between drilling locations, the drilling equipment will be steam cleaned or high pressure washed between work at successive drilling locations. Well casing and screens will also be similarly cleaned prior to installation. Any equipment used for well development will also be cleaned prior to use in any well.

Air rotary is the proposed drilling method for installation of the new monitoring wells. During drilling, drill cuttings will be collected continuously for geologic logging purposes.

5.1 Jordan Wells (Figure 3)

Jordan wells will be constructed as open hole bedrock wells. Initially, an 8-inch steel casing will be grouted in place through the overburden into the top of the Prairie du Chien bedrock. A 7 7/8-inch hole will then be advanced below the surface casing with air rotary drilling techniques until the upper portion of the Jordan Sandstone is encountered. Drilling will continue approximately 5 feet into the Jordan Sandstone. The Prairie du Chien - Jordan contact is reported to be at approximate elevation of 540 to 560 feet NGVD.

A 4-inch low carbon steel casing will then be grouted in place and the grout allowed to set 48 hours (12 hours if hi-early cement is used). The grouting will be accomplished by using a tremie line. A 4-inch open hole will then be advanced approximately 15 feet into the Jordan Sandstone. If caving is apparent in the open bedrock hole, a stainless steel screen with neoprene packers will be telescoped into the well.

By completing the wells in this manner, the potential mixing of waters from the shallower bedrock with that of the upper Jordan Sandstone will be greatly reduced since the entire Prairie du Chien

will be sealed off prior to completing the open hole portion of the well. It also should be noted that the upward vertical gradient, which has been identified by other nearby Jordan wells, is expected to reduce any potential impacts that shallow groundwater may have on that from the upper Jordan Sandstone.

Completed Jordan wells will consist of an 8-inch I.D. low carbon steel surface casing, a 4-inch I.D. low carbon steel casing, and if needed, 4-inch stainless steel screen. A protective casing with locking cap and 3 barrier posts will also be installed. Well centralizers will be used if deemed necessary.

5.2 Prairie du Chien Wells (Figure 3)

Prairie du Chien wells are also anticipated to be completed as open hole wells, and will be installed in the same general manner as previously described for Jordan Wells. However, the well depth will be targeted for the water table which is in the Prairie du Chien bedrock.

A 7 7/8-inch hole will be advanced below the 8-inch surface casing to a depth approximately 10 feet above the static groundwater level (as determined during construction of the deeper Jordan well at each nest). A 4-inch low carbon steel casing will then be grouted in place. A 4-inch open hole will then be advanced to a point approximately 10 feet below the water table. If collapsing bedrock is apparent, well screens will be telescoped into the well with neoprene packers.

Completing the Prairie du Chien wells in this manner will allow for water table fluctuations, as may be influenced by de-watering at the Kraemer Quarry. If necessary, wells constructed in this manner could also be deepened.

5.3 Well Development

Each well will be developed until representative formation water free of the effects of well construction is obtained. Each well shall be pumped for approximately 4 hours by the geotechnical subcontractor using procedures approved by Liesch. All equipment used for development shall be steam cleaned prior to use. Representative formation water shall be assumed to have been obtained when pH, temperature and conductivity readings are stable.

6.0 BOREHOLE GEOPHYSICAL METHODS

Electrical resistivity and spontaneous potential logging as well as natural gamma ray logging will be conducted in new monitoring wells. At nested monitoring well locations, only the deepest well of the nest will be logged. The borehole geophysical results will provide independent confirmation of lithologic variability and will be used to assist in lithologic correlation.

7.0 FIELD HYDRAULIC CONDUCTIVITY TESTING

Field plug tests will be conducted to estimate localized hydraulic conductivity for the proposed Prairie du Chien Wells and Jordan Wells. The tests will be completed following development of new wells and after the initial ground water sampling event. The plug tests will be the falling head and recovery tests, performed as follows:

1. The pretest static water level in the well will be measured.
2. A pressure transducer will be inserted below the static water level, sufficiently deep to avoid contact with the plug upon insertion.

3. A plug (calibrated cylinder of known volume) will be inserted into the well below the static water level to begin the falling head test.
4. Water level readings will be taken with the pressure transducer at intervals based on the well response time.
5. Once water levels are stabilized, the plug will be removed to begin the recovery test. Measurements from the pressure transducer will be recorded in similar time increments.
6. Results will be plotted in the field to determine if the data are sufficient and reliable to enable computation of hydraulic conductivity. If the data is insufficient or deemed unreliable, the tests will be rerun using more appropriate time intervals.

8.0 WATER LEVEL MONITORING

Following completion of the new monitoring wells, water level measurements will be made in all wells on no less than two occasions. This water level monitoring will be in addition to that performed in association with water quality sampling. Water levels will be measured with an electric tape or by the wetted tape method to the nearest 0.01 foot. The measuring device will be wiped clean and rinsed with deionized water prior to each measurement. Water level measuring events will be no less than 1 week apart.

9.0 WATER QUALITY SAMPLING

Two sets of water quality samples will be collected from the following monitoring points:

Surface Water

SW-6
SW-3 (if water is present)

Ground Water

WT-6
WT-9
WT-11B
WT-12B
4 new wells (to be
installed)
U.S. Salt Well (access
must be grouted by U.S.
Salt)

add WT-10

This sampling plan was presented in the letter from Liesch to the MPCA dated July 21, 1989 and acknowledged by the MPCA letter dated August 11, 1989. These letters also indicate that the two RI sampling events will be combined with permit compliance monitoring.

Analysis of the samples collected will include volatile organic compounds, metals and field parameters. Complete parameter lists and specific details regarding sample collection procedures are presented in the Quality Assurance Project Plan (Liesch, October, 1989).

The analytical parameters proposed reflect the results of the initial two (2) sampling events completed during the RI by CRA. Based on the results of Round 1 sampling, a reduced list of target compounds was mutually selected by CRA and the MPCA for the Round 2 sampling event. This parameter list included VOC's and metals.

The analytical results generated during the first 2 sampling rounds by CRA, are presented and discussed in the Remedial Investigation Report (CRA, February, 1989).

10.0 AIR MONITORING PROGRAM

Air quality monitoring has been identified as a necessary part of evaluating the risks associated with the air as a potential contaminant pathway at landfills. The MPCA has indicated that the monitoring requirements must be developed on a site specific basis by the MPCA Air Quality Division. For the investigation at Freeway Sanitary Landfill, air quality monitoring (in terms of evaluating the air as a potential contaminant pathway) has been deferred to be completed during the Feasibility Study (FS). This will allow the MPCA Air Quality Division time to develop specific air monitoring criteria.

Air quality monitoring during installation of the proposed monitoring wells will be completed primarily as a site safety procedure. However, this information, which will be obtained with a photoionization detector and combustible gas monitoring will provide an indication of the presence of organic vapors.

11.0 SCHEDULE

A project schedule was proposed in a letter by Liesch to the MPCA dated August 22, 1989. The schedule for the field activities proposed in this Supplemental Work Plan is presented as Table 2. The proposed schedule was reviewed and modified by the MPCA in a letter dated September 20, 1989. The modified MPCA schedule was accepted by RBMCI and is presented below:

TASK	DEADLINE
Submit Revised Quality Assurance Plan (QAPP), Revised Site Safety Plan, and Revised Remedial Investigation (RI) Work Plan	Within 21 days of issuance of revised Request for Response Action

Implement Remedial Investigation
and Site Safety Plan

Within 21 days of written
notification of written
approval of QAPP and RI
Work Plan and written
comments on Site Safety
Plan

Submit Revised RI Report

Within 175 days of
approval of QAPP and RI
Work Plan

R43:FREE1024

TABLES

TABLE 1
PROPOSED MONITORING WELLS

<u>Proposed Designation⁽¹⁾</u>	<u>Targeted Interval</u>	<u>Anticipated Depth (ft)</u>	<u>Construction</u>	<u>Notes</u>
WT-13	Prairie du Chien (Water Table)	55	4-inch open hole (20 ft)	Nested with J-13 south of Landfill
J-13	Jordan Sandstone (Upper Portion)	180	4-inch open hole (15 ft)	Nested with W-13 south of Landfill
WT-14	Prairie du Chien (Water Table)	85	4-inch open hole (20 ft)	Nested with J-14 near south- west corner of Landfill
J-14	Jordan Sandstone (Upper Portion)	180	4-inch open hole (15 ft)	Nested with WT-14 near south- west corner of Landfill

⁽¹⁾ WT prefix denotes a Water Table Well
J prefix denotes a Jordan Well

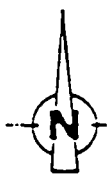
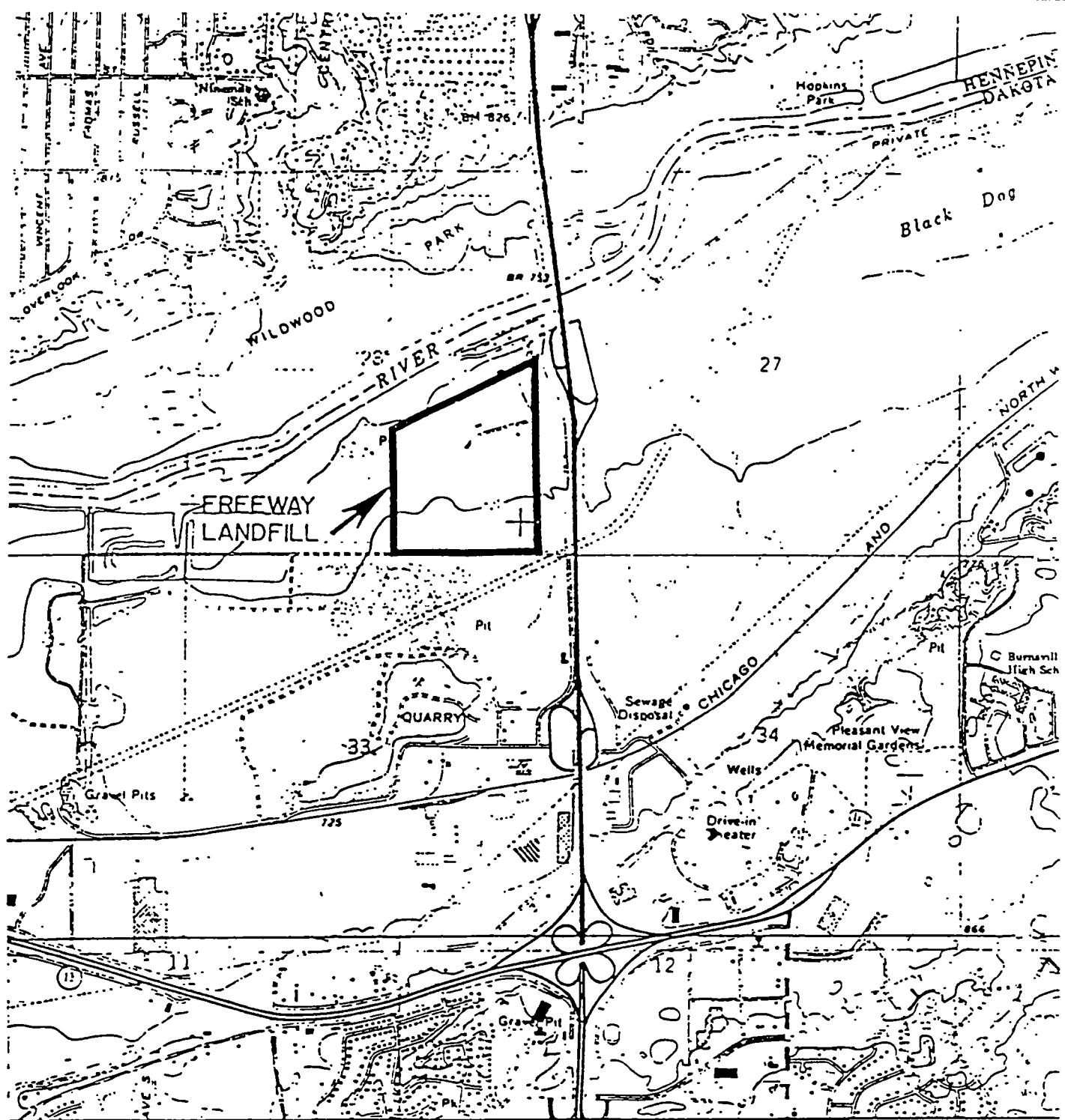
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TABLE 2
 FREEWAY LANDFILL RI/FS
 FIELD ACTIVITY SCHEDULE (WEEKS)

Task Description	Notice To Proceed						
	0	5	10	15	20	25	30
Construct New Monitoring Wells	X-----X						
Stabilize, Sample Wells		X--X	X--X				
Analyze Samples		X-----X	X-----X				
Well Logging/Slug Testing		X---X					
Analyze Data/Revise RI Report					X-----X		

L23:FREEBTL2

FIGURES



QUADRANGLE LOCATION

BLOOMINGTON, MINN.

SCALE: 1:24,000



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FREWAY LANDFILL

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SITE LOCATION MAP

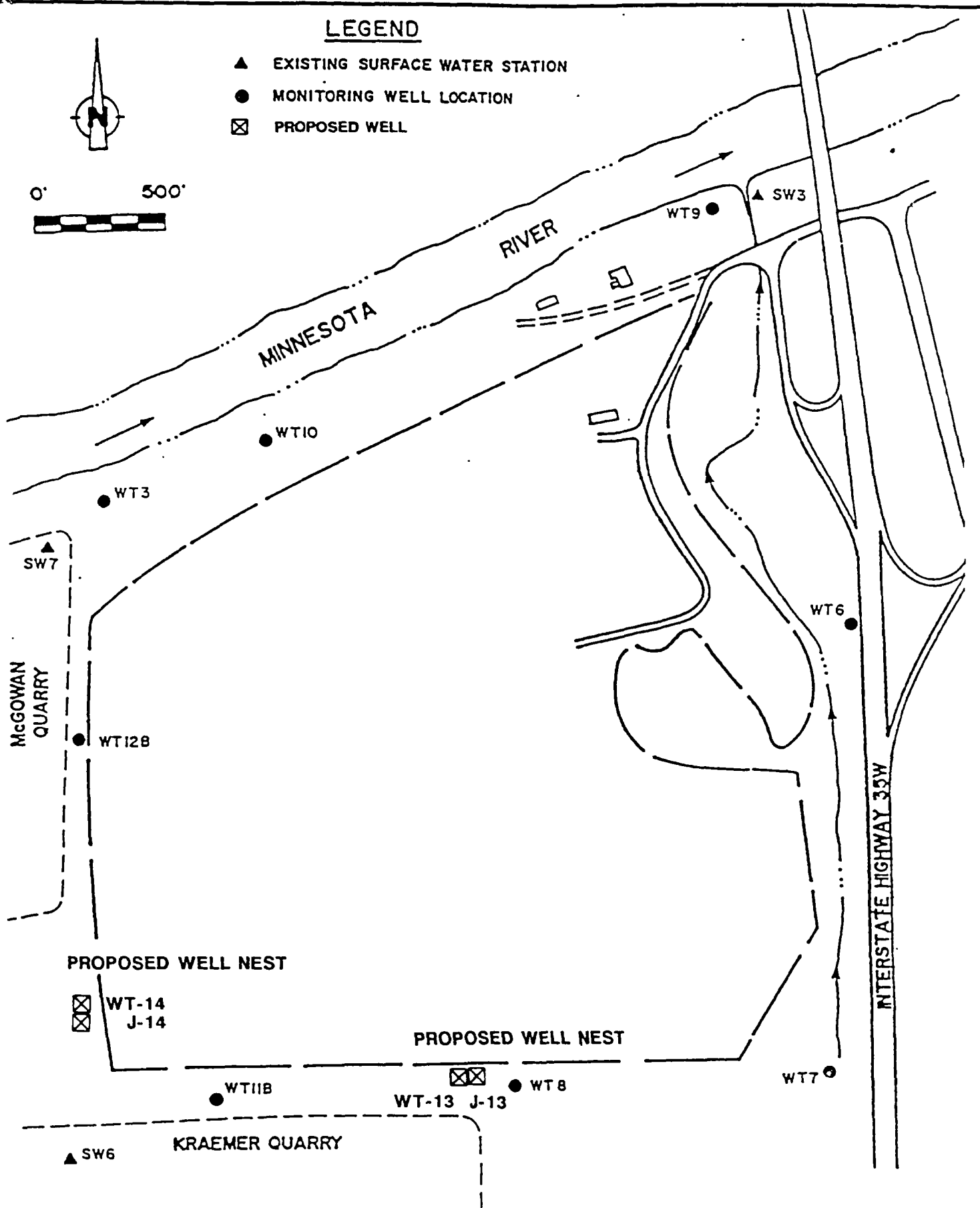
FIG.
1

LEGEND

- ▲ EXISTING SURFACE WATER STATION
- MONITORING WELL LOCATION
- ☒ PROPOSED WELL



0' 500'



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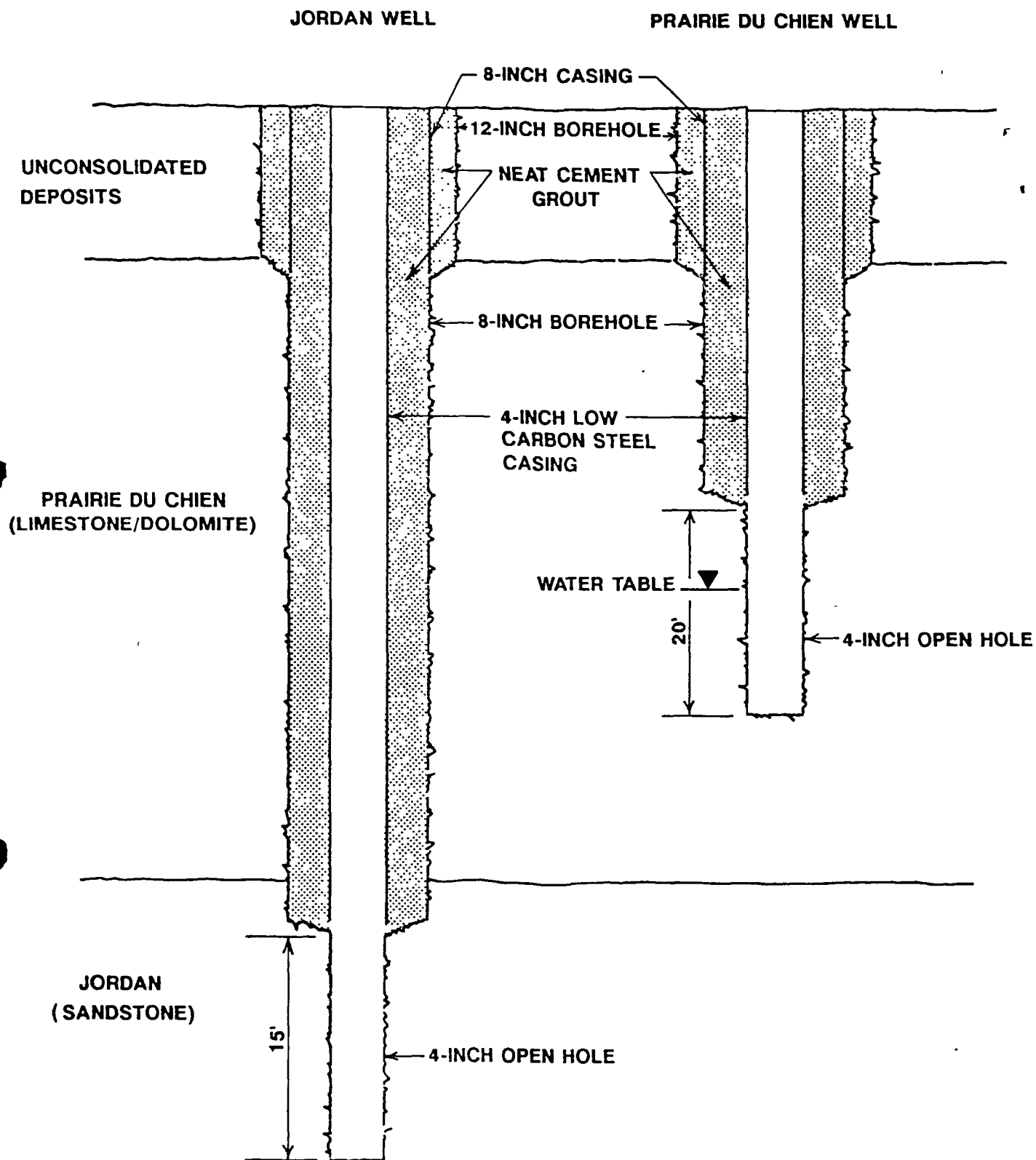
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FREEWAY LANDFILL

PROPOSED WELL LOCATIONS

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FIG.
2



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FREEWAY LANDFILL

PROPOSED MONITORING WELL CONSTRUCTION

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FIG. 3